## 1991 Index IEEE Transactions on Knowledge and Data Engineering Vol. 3

This index covers all items - papers, correspondence, reviews, etc. that appeared in this periodical during 1991, and items from previous years that were commented upon or corrected in 1991.

The Author Index contains the primary entry for each item, listed under the first author's name, and cross-references from all coauthors. The Subject Index contains several entries for each item under appropriate subject headings, and subject cross-references.

It is always necessary to refer to the primary entry in the Author Index for

the exact title, coauthors, and comments/corrections.

#### **AUTHOR INDEX**

Abdelguerfi, M., and Arun K. Sood. Computational complexity of sorting and joining relations with duplicates; T-KDE Dec 91 496-503

Adams-Webber, Jack R., see Ford, Kenneth M., T-KDE Mar 91 78-88

Bagherzadeh, Nader, Seng-lai Heng, and Chuan-lin Wu. A parallel asynchronous garbage collection algorithm for distributed systems; T-KDE Mar 91 100-107

Baral, Chitta, Sarit Kraus, and Jack Minker. Combining multiple knowledge bases; T-KDE Jun 91 208-220

Bilmes, Jeff, see Günther, Oliver, T-KDE Sep 91 342-356 Blevis, Eli, see Glasgow, Janice I., T-KDE Sep 91 307-319 Bourne, John R., Hsi-Ho Liu, Constantine D. Orogo, Glen C. Collins, N.

Serdar Uckun, and Arthur J. Brodersen. Organizing and understanding beliefs in advice-giving diagnostic systems; T-KDE Sep 91 269-280

Brodersen, Arthur J., see Bourne, John R., T-KDE Sep 91 269-280

Brown, David B., see Deason, William H., T-KDE Mar 91 108-117

Carey, Michael J., Rajiv Jauhari, and Miron Livny. On transaction boundaries in active databases: A performance perspective; T-KDE Sep 91 320-336

Cha, Sang K. Kaleidoscope: A cooperative menu-guided query interface (SQL version); T-KDE Mar 91 42-47

Chang, Kai-Hsiung, see Deason, William H., T-KDE Mar 91 108-117

Chang, Paul J., see Ford, Kenneth M., T-KDE Mar 91 78-88

Chen, Jianhua, see Wang, Wu, T-KDE Dec 91 415-420

Collins, Glen C., see Bourne, John R., T-KDE Sep 91 269-280

Corklil, Daniel D. Embedable problem-solving architectures: A study of integrating OPS5 with UMass GBB; T-KDE Mar 91 18-24

Cross James H. H. see Deason William H. T.KDE Mar 91 108-117

Cross, James H., II, see Deason, William H., T-KDE Mar 91 108-117

Deason, William H., David B. Brown, Kai-Hsiung Chang, and James H. Cross, II. A rule-based software test data generator; T-KDE Mar 91

Denna, Eric L., James V. Hansen, and Rayman D. Meservy. Development and application of expert systems in audit services; T-KDE Jun 91 172-184

Dias, Daniel M., see Yu, Philip S., T-KDE Dec 91 525-537

Diederich, Jim, and Jack Milton. Creating domain specific metadata for scientific data and knowledge bases; T-KDE Dec 91 421-434

Dilts, David M., and Wenhua Wu. Using knowledge-based technology to integrate CIM databases (Concise p.); T-KDE Jun 91 237-245

Dionne, Bob, see Mays, Eric, T-KDE Mar 91 33-41

Dixit, Vishweshwar V., and Dan I. Moldovan. Minimal state space search in parallel production systems; T-KDE Dec 91 435-443

Du, David H. C., and Sheau-Ru Tong. Multilevel extendible hashing: A file structure for very large databases; T-KDE Sep 91 357-370

Féret, Michel P., see Glasgow, Janice I., T-KDE Sep 91 307-319
Ford, Kenneth M., Frederick E. Petry, Jack R. Adams-Webber, and Paul J.
Chang. An approach to knowledge acquisition based on the structure of personal construct systems; T-KDE Mar 91 78-88

Ghosh, Sakti P. Statistical relational databases: Normal forms; T-KDE Mar 91 55-64

Glasgow, Janice I., Michael A. Jenkins, Eli Blevis, and Michel P. Féret. Logic programming with arrays; T-KDE Sep 91 307-319
Günther, Oliver, and Jeff Bilmes. Tree-based access methods for spatial databases: Implementation and performance evaluation; T-KDE Sep 91

#### H

Hansen, James V., see Denna, Eric L., T-KDE Jun 91 172-184 Heiss, Hans-Ulrich, see Yu, Philip S., T-KDE Dec 91 525-537 Heng, Seng-lai, see Bagherzadeh, Nader, T-KDE Mar 91 100-107 Hirakawa, Masahito, see Tsuda, Kazuyuki, T-KDE Dec 91 444-460 Homenda, Wladyslaw. Databases with alternative information (Corresp.); T-KDE Sep 91 384-386

Hong, Se June, Guest Ed., see Shrobe, Howard, Guest Ed., T-KDE Mar 91

Ichikawa, Tadao, see Tsuda, Kazuyuki, T-KDE Dec 91 444-460 Ishida, Toru. Parallel rule firing in production systems; T-KDE Mar 91 11-17 Israel, Peggy, see Samad, Tariq, T-KDE Mar 91 89-99

Jauhari, Rajiv, see Carey, Michael J., T-KDE Sep 91 320-336 Jenkins, Michael A., see Glasgow, Janice I., T-KDE Sep 91 307-319 Jensen, Christian S., Leo Mark, and Nick Roussopoulos. Incremental implementation model for relational databases with transaction time; T-KDE Dec 91 461-473

Kang, Hyunchul, see Roussopoulos, Nick, T-KDE Dec 91 486-495
Kook, Hyung Joon, and Gordon S. Novak, Jr. Representation of models for expert problem solving in physics; T-KDE Mar 91 48-54
Kraus, Sarit, see Baral, Chitta, T-KDE Jun 91 208-220
Kumar, Vijay, Jerry Place, and Gi-Chul Yang. An efficient algorithm for mutual exclusion using queue migration in computer networks (Corresp.); T-KDE Sep 91 380-384

Lanka, Sitaram, see Mays, Eric, T-KDE Mar 91 33-41 Liu, Hsi-Ho, see Bourne, John R., T-KDE Sep 91 269-280 Liu, HSI-Ho, see Bourne, John R., I-RDE Sep 91 209-200

Liu, Ken-Chih, and Rajshekhar Sunderraman. A generalized relational model for indefinite and maybe information; T-KDE Mar 91 65-77

Livny, Miron, see Carey, Michael J., T-KDE Sep 91 320-336

Lofaso, Bernie J., see Miranker, Daniel P., T-KDE Mar 91 3-10

Looney, Carl G. Rule acquiring expert controllers (Corresp.); T-KDE Jun 91 252-256 Low, B. T., H. C. Lui, A. H. Tan, and H. H. Teh. Connectionist expert system with adaptive learning capability (Concise p.); T-KDE Jun 91 200-207 Lui, H. C., see Low, B. T., T-KDE Jun 91 200-207

M

MacGregor, Robert, see Yen, John, T-KDE Mar 91 25-32 Malocchi, Roberto, and Barbara Pernici. Temporal data management systems: A comparative view; T-KDE Dec 91 504-524

Mark, Leo, see Jensen, Christian S., T-KDE Dec 91 461-473

Marsten, Roy E., see Ram, Sudha, T-KDE Sep 91 389-395

Massey, A. P., and W. A. Wallace. Focus groups as a knowledge elicitation technique: An exploratory study (Concise p.): T-KDE Jun 91 193-200

technique: An exploratory study (Concise p.); T-KDE Jun 91 193-200
Mays, Eric, Sitaram Lanka, Bob Dionne, and Robert Weida. A persistent store

for large shared knowledge bases; T-KDE Mar 91 33-41
Meservy, Rayman D., see Denna, Eric L., T-KDE Jun 91 172-184
Milton, Jack, see Diederich, Jim, T-KDE Dec 91 421-434
Minker, Jack, see Baral, Chitta, T-KDE Jun 91 208-220

Miranker, Daniel P., and Bemie J. Lofaso. The organization and performance of a TREAT-based production system compiler, T-KDE Mar 91 3-10

Moldovan, Dan I., see Dixit, Vishweshwar V., T-KDE Dec 91 435-443 Motiwalla, Juzar, Guest Ed.. Artificial intelligence in management: Future challenges (special section intro.); T-KDE Jun 91 125-127
 Murata, Tadao, V. S. Subrahmanian, and Toshiro Wakayama. A Petri net

model for reasoning in the presence of inconsistency; T-KDE Sep 91

Neches, Robert, see Yen, John, T-KDE Mar 91 25-32 Noronha, S. J., and V. V. S. Sarma. Knowledge-based approaches for scheduling problems: A survey; *T-KDE Jun 91* 160-171

Novak, Gordon S., Jr., see Kook, Hyung Joon, *T-KDE Mar 91* 48-54

Orogo, Constantine D., see Bourne, John R., T-KDE Sep 91 269-280 Ozsoyoglu, Gultekin, see Su, Tzong-An, T-KDE Dec 91 474-485

#### P

Pao, Yoh-Han, and Dejan J. Sobajic. Neural networks and knowledge engineering; T-KDE Jun 91 185-192

Pau, L. F. Artificial intelligence and financial services; T-KDE Jun 91 137-148

Pernici, Barbara, see Maiocchi, Roberto, T-KDE Dec 91 504-524 Petry, Frederick E., see Ford, Kenneth M., T-KDE Mar 91 78-88

Pirotte, Alain, Dominique Roelants, and Esteban Zimanyi. Controlled generation of intensional answers; T-KDE Jun 91 221-236

Place, Jerry, see Kumar, Vijay, T-KDE Sep 91 380-384

Qian, Xiaolei, and Gio Wiederhold. Incremental recomputation of active relational expressions; T-KDE Sep 91 337-341

Ram, Sudha, and Roy E. Marsten. A model for database allocation incorporating a concurrency control mechanism (Corresp.); T-KDE Sep 91 389-395

Roelants, Dominique, see Pirotte, Alain, T-KDE Jun 91 221-236
Roussopoulos, Nick, see Jensen, Christian S., T-KDE Dec 91 461-473
Roussopoulos, Nick, and Hyunchul Kang. A pipeline N-way join algorithm based on the 2-way semijoin program; T-KDE Dec 91 486-495

### S

Sadri, Fereldoon. Reliability of answers to queries in relational databases (Concise p.); T-KDE Jun 91 245-251

Samad, Tariq, and Peggy Israel. A browser for large knowledge bases based on a hybrid distributed/local connectionist architecture; T-KDE Mar 91

89-99 Sarma, V. V. S., see Noronha, S. J., T-KDE Jun 91 160-171

Shoval, Peretz. One-to-one dependencies in database design (Concise p.); T-KDE Sep 91 371-379

Shrobe, Howard, Guest Ed., and Se June Hong, Guest Ed. Introduction to special section on enabling technology for knowledge-based systems develoment; T-KDE Mar 91 1-2 Simon, Herbert A. Artificial intelligence: Where has it been, and where is it

going?; T-KDE Jun 91 128-136

Singhal, Mukesh. Analysis of the probability of transaction abort and throughput of two timestamp ordering algorithms for database systems (Corresp.); T-KDE Jun 91 261-266

Sobajic, Dejan J., see Pao, Yoh-Han, T-KDE Jun 91 185-192

Sood, Arun K., see Abdelguerfi, M., T-KDE Dec 91 496-503 Spangler, William E. The role of artificial intelligence in understanding the

spangier, William E. The fole of artificial intelligence in understanding the strategic decision-making process; *T-KDE Jun 91* 149-159

Su, Tzong-An, and Gultekin Ozsoyoglu. Controlling FD and MVD inferences in multilevel relational database systems; *T-KDE Dec 91* 474-485

Subrahmanian, V. S., see Murata, Tadao, *T-KDE Sep 91* 281-292

Sunderraman, Rajshekhar, see Liu, Ken-Chih, *T-KDE Mar 91* 65-77

Tan, A. H., see Low, B. T., T-KDE Jun 91 200-207

Tan, A. H., see Low, B. T., T-KDE Jun 91 200-207

Tanaka, Minoru, see Tsuda, Kazuyuki, T-KDE Dec 91 444-460

Teh, H. H., see Low, B. T., T-KDE Jun 91 200-207

Tien, Jenn-Yang, and Wei-Pang Yang. Comments on 'Hash-based and index-based join algorithms for cube and ring connected multicomputers' by E. R. Omiecinski and E. T. Lin; T-KDE Sep 91 387-389 (Original paper, Sep 89 329-343)

Tong, Sheau-Ru, see Du, David H. C., T-KDE Sep 91 357-370

Tsuda, Kazuyuki, Kensaku Yamamoto, Masahito Hirakawa, Minoru Tanaka, and Tadao, Jehikawa MORE: An object-oriented data model with a

and Tadao Ichikawa. MORE: An object-oriented data model with a facility for changing object structures; T-KDE Dec 91 444-460

#### U

Uckun, N. Serdar, see Bourne, John R., T-KDE Sep 91 269-280

#### V

Vidyasankar, K. A non-two-phase locking protocol for global concurrency control in distributed heterogeneous database systems (Corresp.); T-KDE Jun 91 256-261

#### W

Wakayama, Toshiro, see Murata, Tadao, T-KDE Sep 91 281-292 Wallace, W. A., see Massey, A. P., T-KDE Jun 91 193-200
Wang, Fangju. Relational-linear quadtree approach for two-dimensional spatial representation and manipulation; T-KDE Mar 91 118-122 Wang, Wu, and Jianhua Chen. Learning by discovering problem solving heuristics through experience; T-KDE Dec 91 415-420 Welda, Robert, see Mays, Eric, T-KDE Mar 91 33-41

Wiederhold, Gio, see Qian, Xiaolei, T-KDE Sep 91 337-341 Wu, Chuan-lin, see Bagherzadeh, Nader, T-KDE Mar 91 100-107 Wu, Wenhua, see Dilts, David M., T-KDE Jun 91 237-245

Yager, Ronald R. Deductive approximate reasoning systems; T-KDE Dec 91 399-414

Yamamoto, Kensaku, see Tsuda, Kazuyuki, T-KDE Dec 91 444-460 Yang, Gi-Chul, see Kumar, Vijay, T-KDE Sep 91 380-384 Yang, Wei-Pang, see Tien, Jenn-Yang, T-KDE Sep 91 387-389

Yasdi, Ramin. Learning classification rules from database in the context of

knowledge acquisition and representation; T-KDE Sep 91 293-306
Yen, John, Robert Neches, and Robert MacGregor. CLASP: Integrating term subsumption systems and production systems; T-KDE Mar 91 25-32
Yu, Philip S., Hans-Ulrich Heiss, and Daniel M. Dias. Modeling and analysis

of a time-stamp history based certification protocol for concurrency control; T-KDE Dec 91 525-537

#### SUBJECT INDEX

rule-based software test data generator for Ada programs. Deason, William H., +, T-KDE Mar 91 108-117

Adaptive control; cf. Learning control systems Adaptive systems; cf. Learning systems; Neural networks

Advisory systems; cf. Decision-support systems; Expert systems

Algebra; cf. Database systems, relational

Arrays; cf. Data structures

Artificial intelligence

artificial intelligence and management (special section). T-KDE Jun 91 125-207

past and future of artificial intelligence. Simon, Herbert A., T-KDE Jun 91 128-136

Artificial intelligence; cf. Decision-support systems; Expert systems; Intelligent systems; Learning systems

Bibliographies

knowledge acquisition approach based on structure of personal construct systems; application to radiology expert system. Ford, Kenneth M., +, T-KDE Mar 91 78-88

requirements and design techniques of artificial intelligence for financial services. Pau, L. F., T-KDE Jun 91 137-148

role of artificial intelligence in understanding strategic decision-making process. Spangler, William E., T-KDE Jun 91 149-159

survey of knowledge-based approaches for scheduling problems.

Noronha, S. J., +, T-KDE Jun 91 160-171

Buffered communication; cf. Queued communication

**Business economics** 

expert systems development and application for audit services. Denna, Eric L., +, T-KDE Jun 91 172-184

requirements and design techniques of artificial intelligence for financial services. Pau, L. F., T-KDE Jun 91 137-148

Business economics; cf. Computer economics

AR-1 formal deductive approximate reasoning system. Yager, Ronald R., T-KDE Dec 91 399-414

organizing and understanding beliefs in advice-giving diagnostic systems.

Bourne, John R., +, T-KDE Sep 91 269-280

Cognitive science; cf. Artificial intelligence

Communication protocols; cf. Protocols

Communication switching; cf. Queued communication

TREAT-based production system compiler organization and performance. Miranker, Daniel P., +, T-KDE Mar 91 3-10

comments on 'Hash-based and index-based join algorithms for cube and ring connected multicomputers' by E. R. Omiecinski and W.-P. Yang. Tien, Jenn-Yang, +, T-KDE Sep 91 387-389 (Original paper, Sep 89 329-343)

Computer fault tolerance

nonsymmetric deadlock-free algorithm for mutual exclusion using queue migration in computer networks. Kumar, Vijay, +, T-KDE Sep 91

Computer-integrated manufacturing; cf. Manufacturing automation Computer interfaces, human factors; cf. User-interface management systems

Computer language processors; cf. Compilers

Computer languages
integrating OPS5 with UMass Generic Blackboard Framework to form embeddable problem-solving architecture. Corkill, Daniel D., T-KDE Mar 91 18-24

Computer languages; cf. Ada; Data structures; Query languages

Computer networks; cf. Multiprocessing

Computer performance

computational complexity of sorting and joining relations with duplicates. Abdelguerfi, M., +, T-KDE Dec 91 496-503

Computer pipeline processing; cf. Pipeline processing.

Computer reliability; cf. Computer fault tolerance; Software reliability

Computer security; cf. Data security Computer vision; cf. Machine vision Computers; cf. Parallel processing

Control systems; cf. Learning control systems; Manufacturing automation

D

Data communication; cf. Queued communication

Data management

comparison of six temporal data management systems. Maiocchi, Roberto, +, T-KDE Dec 91 504-524

Data management; cf. Database management systems; Distributed database management systems

Data models

generalized relational model for indefinite and maybe-type information using M-table. Liu, Ken-Chih, +, T-KDE Mar 91 65-77
MORE object-oriented data model with facility for changing object

structures. Tsuda, Kazuyuki, +, T-KDE Dec 91 444-460 one-to-one dependencies in database design. Shoval, Peretz, T-KDE Sep

91 371-379

Data processing; cf. Database systems; Financial data processing Data security

controlling functional and multivalued dependency inferences in multilevel relational database systems. Su, Tzong-An, +, T-KDE Dec 91 474-485

generalized relational model for indefinite and maybe-type information

using M-table. Liu, Ken-Chih, +, T-KDE Mar 91 65-77 integrating OPS5 with UMass Generic Blackboard Framework to form embeddable problem-solving architecture. Corkill, Daniel D., T-KDE Mar 91 18-24

Nial logic programming language integrating array-based programming with declarative capabilities of logic. Glasgow, Janice I., +, T-KDE Sep

parallel asynchronous garbage collection algorithm for distributed systems. Bagherzadeh, Nader, +, T-KDE Mar 91 100-107

Data structures; cf. Database systems; Quadtrees/octrees

Database management systems
multilevel extendible hashing file structure for very large databases. Du,
David H. C., +, T-KDE Sep 91 357-370

performance model to study effects of transaction boundaries on active databases. Carey, Michael J., +, T-KDE Sep 91 320-336 version store persistent storage structure for large shared knowledge bases. Mays, Eric, +, T-KDE Mar 91 33-41

Database management systems; cf. Database systems, query processing; Distributed database management systems; Memory management

Database security; cf. Data security

Database systems

creating domain-specific metadata for scientific data and knowledge bases. Diederich, Jim, +, T-KDE Dec 91 421-434

learning classification rules from database in context of knowledge

acquisition and representation. Yasdi, Ramin, T-KDE Sep 91 293-306
Nial logic programming language integrating array-based programming
with declarative capabilities of logic. Glasgow, Janice I., +, T-KDE Sep
91 307-319

relational-linear quadtree approach for 2-D spatial data representation and manipulation. Wang, Fangju, T-KDE Mar 91 118-122

Database systems; cf. Data models; Data structures; Database management

systems; Query languages; Statistical databases

Database systems, concurrency operations; cf. Distributed database systems, concurrency operations

Database systems, query processing controlled generation of intensional answers as consequence of queries and deduction rules. Pirotte, Alain, +, T-KDE Jun 91 221-236

determining reliability of answers to queries in relational databases. Sadri, Fereidoon, T-KDE Jun 91 245-251

incremental implementation model for relational databases with

transaction time. Jensen, Christian S., +, T-KDE Dec 91 461-473
Petri net model for logic programming query processing in presence of inconsistency. Murata, Tadao, +, T-KDE Sep 91 281-292

Database systems, query processing; cf. Distributed database systems, query processing

Database systems, relational

computational complexity of sorting and joining relations with duplicates.

Abdelguerfi, M., +, T-KDE Dec 91 496-503

controlling functional and multivalued dependency inferences in

multilevel relational database systems. Su, Tzong-An, +, T-KDE Dec 91 474-485

databases that distinguish and process alternative information. Homenda, Wladyslaw, T-KDE Sep 91 384-386

determining reliability of answers to queries in relational databases. Sadri, Fereidoon, T-KDE Jun 91 245-251

generalized relational model for indefinite and maybe-type information

using M-table. Liu, Ken-Chih, +, T-KDE Mar 91 65-77 incremental implementation model for relational databases with transaction time. Jensen, Christian S., +, T-KDE Dec 91 461-473

incremental recomputation of active relational expressions using finite differencing technique. Qian, Xiaolei, +, T-KDE Sep 91 337-341 normal forms of relational tables relevant to statistical processing. Ghosh, Sakti P., T-KDE Mar 91 55-64

Database systems, relational; cf. Distributed database systems, relational; Query languages

Database systems, searching tree-based access methods for spatial databases. Günther, Oliver, +, T-KDE Sep 91 342-356

Database systems, searching; cf. Search methods

Decision-making; cf. Decision-support systems; Expert systems; Pattern classification

**Decision-support systems** 

organizing and understanding beliefs in advice-giving diagnostic systems. Bourne, John R., +, T-KDE Sep 91 269-280

Design automation

knowledge-based systems used to integrate CIM (computer integrated manufacturing) databases. Dilts, David M., +, T-KDE Jun 91 237-245

Diagnosis; cf. Fault diagnosis

Difference methods; cf. Finite-difference methods Discrete-event systems; cf. Production systems

Distributed computing; cf. Multiprocessing

Distributed database management system; cf. Distributed database systems, concurrency operations

Distributed database management systems algorithms for combining knowledge bases to generate a maximal theory. Baral, Chitta, +, T-KDE Jun 91 208-220

knowledge-based systems used to integrate (CIM) (computer integrated manufacturing) databases. Dilts, David M., +, T-KDE Jun 91 237-245

Distributed database management systems; cf. Distributed database systems, query processing Distributed database systems, concurrency

Distributed database systems, concurrency operations

model for database allocation incorporating concurrency control mechanism. Ram, Sudha, +, T-KDE Sep 91 389-395
non-two-phase locking protocology of global concurrency control in

distributed heterogeneous database systems. Vidyasankar, K., T-KDE Jun 91 256-261

probability analysis of transaction abort and throughput of two timestamp ordering algorithms for database systems. Singhal, Mukesh, T-KDE Jun 91 261-266

time-stamp-history based certification protocol for concurrency control of transaction processing systems. Yu, Philip S., +, T-KDE Dec 91 525-537 Distributed database systems, query processing pipeline N-way join algorithm based on two-way semijoin program for distributed to the processing process.

distributed query processing. Roussopoulos, Nick, +, T-KDE Dec 91 486-495

Distributed database systems, relational

comments on 'Hash-based and index-based join algorithms for cube and ring connected multicomputers' by E. R. Omiecinski and W.-P. Yang. Tien, Jenn-Yang, +, T-KDE Sep 91 387-389 (Original paper, Sep 89 329-343)

E

Economics; cf. Business economics; Computer economics **Expert systems** 

algorithms for combining knowledge bases to generate a maximal theory. Baral, Chitta, +, T-KDE Jun 91 208-220

bi-Markov model for self-organizing adapting controllers. Looney, Carl G., T-KDE Jun 91 252-256

CLASP classification-based production system using semantic pattern matcher and classifer. Yen, John, +, T-KDE Mar 91 25-32

enabling technology for knowledge-based systems development (special section). T-KDE Mar 91 1-54

expert systems development and application for audit services. Denna, Eric L., +, T-KDE Jun 91 172-184

focus groups for knowledge elicitation; study results. Massey, A. P., +, T-KDE Jun 91 193-200

integrating OPS5 with UMass Generic Blackboard Framework to form embeddable problem-solving architecture. Corkill, Daniel D., T-KDE Mar 91 18-24

learning classification rules from database in context of knowledge acquisition and representation. Yasdi, Ramin, T-KDE Sep 91 293-306 parallel rule firing for forward chaining production systems. Ishida, Toru, T-KDE Mar 91 11-17

pattern matching and rule inferencing adaptive connectionist expert system (ACES) based on neural logic networks. Low, B. T., +, T-KDE Jun 91 200-207

relational-linear quadtree approach for 2-D spatial data representation and manipulation. Wang, Fangju, T-KDE Mar 91 118-122 requirements and design techniques of artificial intelligence for financial services. Pau, L. F., T-KDE Jun 91 137-148

role of artificial intelligence in understanding strategic decision-making process. Spangler, William E., T-KDE Jun 91 149-159 rule-based software test data generator for Ada programs. Deason, William H., +, T-KDE Mar 91 108-117

SAFE learning system that discovers problem-solving heuristics through experience. Wu, Wang, +, T-KDE Dec 91 415-420 survey of knowledge-based approaches for scheduling problems. Noronha, S. J., +, T-KDE Jun 91 160-171

TREAT-based production system compiler organization and performance.

Miranker, Daniel P., +, T-KDE Mar 91 3-10

version store persistent storage structure for large shared knowledge bases.

Mays, Eric, +, T-KDE Mar 91 33-41
Expert systems; cf. Intelligent systems; Medical expert systems

Factory automation; cf. Manufacturing automation Fault diagnosis

organizing and understanding beliefs in advice-giving diagnostic systems. Bourne, John R., + , T-KDE Sep 91 269-280

Fault tolerance; cf. Computer fault tolerance

File systems; cf. Database systems

Financial data processing

expert systems development and application for audit services. Denna, Eric L., +, T-KDE Jun 91 172-184

requirements and design techniques of artificial intelligence for financial services. Pau, L. F., T-KDE Jun 91 137-148

Finite-difference methods

incremental recomputation of active relational expressions using finite differencing technique. Qian, Xiaolei, +, T-KDE Sep 91 337-341 Forecasting; cf. Technology forecasting

Fuzzy set theory
AR-1 formal deductive approximate reasoning system. Yager, Ronald R.,

Garbage management; cf. Memory management

Hierarchical systems; cf. Multilevel systems

Image coding; cf. Quadtrees/octrees Industrial control; cf. Manufacturing automation Information systems; cf. Database systems **Intelligent systems** 

knowledge-based systems used to integrate CIM (computer integrated manufacturing) databases. Dilts, David M., +, T-KDE Jun 91 237-245 Interconnected systems; cf. Multilevel systems

Knowledge acquisition; cf. Expert systems

Knowledge-based systems; cf. Artificial intelligence; Database...; Expert systems; Intelligent systems

Knowledge representation
CLASP classification-based production system using semantic pattern matcher and classifer. Yen, John, +, T-KDE Mar 91 25-32

integrating OPS5 with UMass Generic Blackboard Framework to form embeddable problem-solving architecture. Corkill, Daniel D., T-KDE Mar 91 18-24

knowledge representation in neural network computing. Pao, Yoh-Han, + , T-KDE Jun 91 185-192

learning classification rules from database in context of knowledge acquisition and representation. Yasdi, Ramin, T-KDE Sep 91 293-306 representation of models of expert problem solving in physics; APEX computer program. Kook, Hyung Joon, +, T-KDE Mar 91 48-54

L

Languages; cf. Computer languages

Learning control systems
bi-Markov model for self-organizing adapting controllers. Looney, Carl G., T-KDE Jun 91 252-256

Learning systems

learning classification rules from database in context of knowledge acquisition and representation. Yasdi, Ramin, T-KDE Sep 91 293-306

SAFE learning system that discovers problem-solving heuristics through experience. Wu, Wang, +, T-KDE Dec 91 415-420

Learning systems; cf. Neural networks

Logic programming

Nial logic programming language integrating array-based programming with declarative capabilities of logic. Glasgow, Janice I., +, T-KDE Sep

Petri net model for logic programming query processing in presence of inconsistency. Murata, Tadao, +, T-KDE Sep 91 281-292

**Machine vision** 

relational-linear quadtree approach for 2-D spatial data representation and manipulation. Wang, Fangju, T-KDE Mar 91 118-122

Management; cf. Project management

Manufacturing automation

knowledge-based systems used to integrate CIM (computer integrated manufacturing) databases. Dilts, David M., +, T-KDE Jun 91 237-245

Markov processes bi-Markov model for self-organizing adapting controllers. Looney, Carl G., T-KDE Jun 91 252-256

Medical expert systems

knowledge acquisition approach based on structure of personal construct systems; application to radiology expert system. Ford, Kenneth M., +, T-KDE Mar 91 78-88

Memory management
parallel asynchronous garbage collection algorithm for distributed
systems. Bagherzadeh, Nader, +, T-KDE Mar 91 100-107
Memory management; cf. Database management systems

Minimization methods; cf. Optimization methods Modeling; cf. Data models; Petri nets; Specific topic Multiaccess communication; cf. Queued communication

Multilevel systems controlling functional and multivalued dependency inferences in multilevel relational database systems. Su, Tzong-An, +, T-KDE Dec 91 474-485

Multiprocessing

ring connected multicomputers' by E. R. Omiecinski and W.-P. Yang. Tien, Jenn-Yang, +, T-KDE Sep 91 387-389 (Original paper, Sep 89 329-343) comments on 'Hash-based and index-based join algorithms for cube and

parallel asynchronous garbage collection algorithm for distributed systems. Bagherzadeh, Nader, +, T-KDE Mar 91 100-107

Natural language systems; cf. Query languages Networks; cf. Neural networks; Petri nets

Neural networks

browser for large knowledge bases based on hybrid distributed/local connectionist architecture. Samad, Tariq. +, T-KDE Mar 91 89-99 knowledge representation in neural network computing. Pao, Yoh-Han, +, T-KDE Jun 91 185-192

pattern matching and rule inferencing adaptive connectionist expert system (ACES) based on neural logic networks. Low, B. T., +, T-KDE Jun 91 200-207

Numerical methods; cf. Finite-difference methods; Optimization methods

Object-oriented programming MORE object-oriented data model with facility for changing object structures. Tsuda, Kazuyuki, +, T-KDE Dec 91 444-460

**Operations** research

past and future of artificial intelligence. Simon, Herbert A., T-KDE Jun 91 128-136

**Optimization methods** 

pipeline N-way join algorithm based on two-way semijoin program for distributed query processing. Roussopoulos, Nick, +, T-KDE Dec 91

Oral communication

focus groups for knowledge elicitation; study results. Massey, A. P., +, T-KDE Jun 91 193-200

Parallel processing

minimal state-space search in parallel production systems. Dixit, Vishweshwar V., +, T-KDE Dec 91 435-443

parallel rule firing for forward chaining production systems. Ishida, Toru, T-KDE Mar 91 11-17

Parallel processing; cf. Multiprocessing; Pipeline processing Pattern classification

CLASP classification-based production system using semantic pattern matcher and classifer. Yen, John, +, T-KDE Mar 91 25-32

Pattern matching

CLASP classification-based production system using semantic pattern matcher and classifer. Yen, John, +, T-KDE Mar 91 25-32

pattern matching and rule inferencing adaptive connectionist expert system (ACES) based on neural logic networks. Low, B. T., +, T-KDE Jun 91 200-207

Petri nets

Petri net model for logic programming query processing in presence of inconsistency. Murata, Tadao, +, T-KDE Sep 91 281-292

representation of models of expert problem solving in physics; APEX computer program. Kook, Hyung Joon, +, T-KDE Mar 91 48-54

Pipeline processing

pipeline N-way join algorithm based on two-way semijoin program for distributed query processing. Roussopoulos, Nick, +, T-KDE Dec 91

Planning; cf. Project management Privacy; cf. Data security

**Production systems** 

CLASP classification-based production system using semantic pattern matcher and classifer. Yen, John, +, T-KDE Mar 91 25-32

minimal state-space search in parallel production systems. Dixit, Vishweshwar V., +, T-KDE Dec 91 435-443

parallel rule firing for forward chaining production systems. Ishida, Toru, T-KDE Mar 91 11-17

TREAT-based production system compiler organization and performance. Miranker, Daniel P., +, T-KDE Mar 91 3-10

Professional communication; cf. Oral communication

Programming; cf. Logic programming

Project management

artificial intelligence and management (special section). T-KDE Jun 91 125-207

survey of knowledge-based approaches for scheduling problems. Noronha, S. J., +, T-KDE Jun 91 160-171

non-two-phase locking protocol for global concurrency control in distributed heterogeneous database systems. Vidyasankar, K., T-KDE Jun 91 256-261

time-stamp-history based certification protocol for concurrency control of transaction processing systems. Yu, Philip S., +, T-KDE Dec 91 525-537

Q

Quadtrees/octrees

relational-linear quadtree approach for 2-D spatial data representation and manipulation. Wang, Fangju, T-KDE Mar 91 118-122

generalized relational model for indefinite and maybe-type information

using M-table. Liu, Ken-Chih, +, T-KDE Mar 91 65-77
Kaleidoscope cooperative menu-guided query interface using SQL and natural language. Cha, Sang K., T-KDE Mar 91 42-47

Queued communication

nonsymmetric deadlock-free algorithm for mutual exclusion using queue migration in computer networks. Kumar, Vijay, +, T-KDE Sep 91 380-384

Queued communication; cf. Distributed database systems, concurrency

Reasoning; cf. Cognitive science Reliability; cf. Software reliability Rule-based systems; cf. Expert systems

Scheduling

survey of knowledge-based approaches for scheduling problems. Noronha, S. J., +, T-KDE Jun 91 160-171

Search methods

browser for large knowledge bases based on hybrid distributed/local connectionist architecture. Samad, Tariq, +, T-KDE Mar 91 89-99 minimal state-space search in parallel production systems. Dixit, Vishweshwar V., +, T-KDE Dec 91 435-443 version store persistent storage structure for large shared knowledge bases. Mays, Eric, +, T-KDE Mar 91 33-41

Search methods; cf. Database systems, searching

Security; cf. Data security

Set theory; cf. Fuzzy set theory

Software; cf. Computer languages; Database management systems; Distributed database management systems

Software, utility programs

parallel asynchronous garbage collection algorithm for distributed systems. Bagherzadeh, Nader, +, T-KDE Mar 91 100-107

Software, utility programs; cf. User-interface management systems

Software development environments; cf. Logic programming Software reliability

rule-based software test data generator for Ada programs. Deason, William H., +, T-KDE Mar 91 108-117

computational complexity of sorting and joining relations with duplicates.

Abdelguerfi, M., +, T-KDE Dec 91 496-503

Speaking; cf. Oral communication

Special issues/sections

artificial intelligence and management (special section). T-KDE Jun 91 125-207

enabling technology for knowledge-based systems development (special section). T-KDE Mar 91 1-54

normal forms of relational tables relevant to statistical processing. Ghosh, Sakti P., T-KDE Mar 91 55-64
Stochastic processes; cf. Markov processes

T

Technical communication; cf. Oral communication

**Technology forecasting** 

past and future of artificial intelligence. Simon, Herbert A., T-KDE Jun 91 128-136

Time-dependent systems; cf. Data management

Trees, graphs; cf. Database systems, searching; Search methods

User-interface management systems

Kaleidoscope cooperative menu-guided query interface using SQL and natural language. Cha, Sang K., T-KDE Mar 91 42-47 Utility programs; cf. Software, utility programs

Vision systems (nonbiological); cf. Machine vision

### **Information for Authors**

The IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING is an archival journal published quarterly. The information published in this TRANSACTIONS is designed to inform researchers, developers, managers, strategic planners, users, and others interested in state-of-the-art and state-of-the-practice activities in the knowledge and data engineering area. We are interested in well-defined theoretical results and empirical studies that have potential impact on the acquisition, management, storage, and graceful degeneration of knowledge and data; as well as in provision of knowledge and data services. We welcome treatments of the role of knowledge and data in the development and use of information systems and in the simplification of software and hardware development and maintenance. Since the journal is archival, it is assumed that the ideas presented are important, have been well analyzed and/or empirically validated, and are of value to the knowledge and data engineering research community.

Specific topics include, but are not limited to: a) artificial intelligence techniques, including speech, voice, graphics, images, and documents; b) knowledge and data engineering tools and techniques; c) parallel and distributed processing; d) real-time distributed processing; e) system architectures, integration, and modeling; f) database design, modeling, and management; g) query design, and implementation languages; h) distributed database control; i) statistical databases; j) algorithms for data and knowledge management; k) performance evaluation of algorithms and systems; 1) data communications aspects; m) system applications and experience; n) knowledge-based and

expert systems; and o) integrity, security, and fault tolerance.

Papers that may be submitted for consideration include those that have not previously been published in another journal, or are not currently being published, as well as those that have been published in Conference Proceedings, Digests, and Records and that have undergone substantial revision. The author is responsible for obtaining all necessary copyright releases for copyrighted material which has appeared in non-IEEE publications. It is IEEE's policy (policy 6.16) to assume that all clearances have been received by the author by the time a paper is submitted for publication.

Delays can be minimized by preparing the manuscript according to the following suggestions.

### Process of Submission of a Technical Paper and/or Proposal of a Special Issue

1) For invited papers, six copies, complete with illustrations, abstract, and index terms, should be sent to the Editor-in-Chief, Dr. C. V. Ramamoorthy

2) Proposals for special issues should initially be discussed informally with Dr. Ramamoorthy. After positive feedback, a proposal which includes the following components should be submitted: a) aim; b) audience, or who will benefit; c) topics covered; d) possible authors and titles; e) possible reviewers for submitted papers; f) target date for submission of papers; g) vitae for parties proposing the issue. All proposals will be reviewed by members of the TRANSACTIONS Editorial Board.

3) For papers to be considered for regular issues, six copies of the manuscript, each complete with illustrations, abstract, and index terms, should be sent to the Associate Editor-in-Chief, Dr. Benjamin Wah.

4) Enclose a signed IEEE copyright transfer form with each manuscript.

5) Enclose with each manuscript, on a separate page, from five to ten index terms (key phrases). These terms should be relatively independent (coordinate index terms), and as a group should optimally characterize the paper.

6) Enclose originals for the illustrations, in the style described below. Alternately, good quality copies may be sent initially, with the

originals ready to be sent immediately upon acceptance of the paper.

7) Enclose a separate page giving your telephone number and preferred address for correspondence and return of proofs.

8) Enclose a technical biography and a photograph of each author of the paper or be ready to supply these upon acceptance of the paper. Biographies and photographs will only be published in full papers and not in concise papers or correspondence. For biography style, see an IEEE TRANSACTIONS.

9) The referee process assures the anonymity of the reviewers of your paper. It is also possible to provide a review in which the author's identity is kept from the reviewers. Should you wish to take advantage of this provision, please make your desires explicit in this regard in your cover letter to the Editor-in-Chief. In this case, your name must appear only on a removable cover page.

#### Style for Manuscript

1) Typewrite and double space; use one side of sheet only. (Good office-duplicate copies are acceptable.)

2) Provide an informative 100-to-250 word abstract and index terms in alphabetical order at the head of the manuscript. A concise paper requires an abstract of 100-to-150 words, and a correspondence requires 50 words or less. The abstracts are printed with the articles.

3) Provide a separate double-spaced sheet listing all footnotes, beginning with "Affiliation of author" and continuing with numbered references. Acknowledgment of financial support may be given, if appropriate.

4) References should be numbered and appear in a separate bibliography at the end of the paper. Use numerals in square brackets to cite references, e.g., [15]. References should be complete, in IEEE style, and in general should be accessible to our readers.

Style for papers: Author, first initials followed by last name, title, volume, page numbers, month and year. Style for books: Author, title, publisher and location, year, chapter or page numbers (if desired).

(See this issue for further examples.)

5) Provide a separate sheet listing all figure captions, in proper style for the typesetter, e.g., "Fig. 1. Example of a disjoint and distraught

6) For further information see "Information for IEEE Authors," available from the IEEE Publications Department, 345 East 47 Street, New York, NY 10017.

#### C. Style for Illustrations

1) Originals for illustrations (including tables) should be sharp, noise-free, and of good contrast. We regret that we cannot provide drafting or art services.

2) Line drawings should be in black ink on white background. Use 8 1/2 by 11-inch size sheets if possible, to simplify handling of the

3) On graphs, show only the coordinate axes, or at most the major grid lines, to avoid a dense, hard-to-read result.

4) All lettering should be large enough to permit legible reduction of the figure to column width, perhaps as much as 4 to 1. Photographs should be glossy prints, of good contrast and gradation, and any reasonable size.

Number each original on the back, or at the bottom of the front.

Note item B-5) above. Captions lettered on figures will be blocked out in reproduction in favor of typeset captions.

Voluntary Page Charges: After a manuscript has been accepted for publication, the author's company or institution will be requested to pay a voluntary charge of \$110 per printed page to cover part of the cost of publication. Page charges for the IEEE TRANSACTIONS are not obligatory nor is their payment a prerequisite for publication. The author will receive 100 free reprints without covers if the charge is honored. Detailed instructions will accompany the galley proof. Administration of the page charges is handled by the New York office, and the editorial staff of this TRANSACTIONS has no connection with it.

### THE FOLLOWING INFORMATION IS AVAILABLE:

Contact the Publications Office: to facilitate handling, please request by number.

- Membership application, student #203, others #202
- Periodicals subscription form for individuals #200
- Periodicals subscription form for organizations #199
- Publications catalog #201
- Compmail electronic mail brochure #194
- Technical committee list/application #197
- Chapters lists, start-up procedures #193
- Student scholarship information #192
- Volunteer leaders/staff directory #196
- IEEE senior member grade application #204

(requires ten years practice and significant performance in five of those ten)

To check membership status or report a change of address, call the IEEE toll-free number, 1-800-678-4333. Direct all other Computer Society related questions to the Publications

#### **PURPOSE**

The IEEE Computer Society advances the theory and practice of computer science and engineering, promotes the exchange of technical information among 100,000 members worldwide, and provides a wide range of services to members and nonmembers.

#### **MEMBERSHIP**

Members receive the acclaimed monthly magazine Computer, discounts, and opportunities to serve (all activities are led by volunteer members). Membership is open to all IEEE members, affiliate society members, and others interested in the computer field.

# 1951-1991 40 YEARS OF SERVICE

**IEEE COMPUTER SOCIETY** 

A member society of the Institute of Electrical and Electronics Engineers, Inc.

### **PUBLICATIONS AND ACTIVITIES**

Computer. An authoritative, easy-to-read magazine containing tutorial and in-depth articles on topics across the computer field, plus news, conferences, calendar, interviews. and product reviews.

Periodicals. The society publishes six magazines and five research transactions. Refer to membership application or request information as noted above.

Conference Proceedings, Tutorial Texts, Standard **Documents.** The Computer Society Press publishes more than 100 titles every

Standards Working Groups. Over 100 of these groups produce IEEE standards used throughout the industrial world.

Technical Committees. More than 30 TCs publish newsletters, provide interaction with peers in specialty areas, and directly influence standards, conferences,

Conferences/Education. The society holds about 100 conferences each year and sponsors many educational activities, including computing science accreditation.

**Chapters.** Regular and student chapters worldwide provide the opportunity to interact with colleagues, hear technical experts, and serve the local professional community

### **OMBUDSMAN**

Members experiencing problems — magazine delivery, membership status, or unresolved complaints — may write to the ombudsman at the Publications Office.

#### **EXECUTIVE COMMITTEE**

President: Duncan H. Lawrie\* University of Illinois Dept. of Computer Science 1304 W. Springfield Urbana, IL. 61801 (217) 333-3373

President-Elect: Bruce D. Shriver\* Past President: Helen M. Wood\*

VP, Standards: Paul L. Borrill (1st VP)\* VP, Press Activities: Barry W. Johnson (2nd VP)\* VP. Conferences and Tutorials: Laurel V. Kaledat VP, Education: Raymond E. Miller<sup>†</sup> VP, Membership Activities Ronald D. Williams† VP, Publications: Ronald G. Hoelzemant VP, Technical Activities: Mario R. Barbacci\*

> James H. Aylor\* Secretary: Joseph Boykin† Treasurer: Division V Director: Edward A. Parrish, Jr.† Division VIII Director: Helen M. Wood\* Executive Director: T. Michael Elliott<sup>†</sup>

\*voting member of the Board of Governors <sup>†</sup>nonvoting member of the Board of Governors

### **BOARD OF GOVERNORS**

### Term Expiring 1991:

P. Bruce Berra, Michael Evangelist, Ted Lewis, Raymond E. Miller, Earl E. Swartzlander, Jr., Joseph E. Urban, Thomas W. Williams

#### Term Expiring 1992:

James H. Aylor, Alicja I. Ellis, Tadao Ichikawa, C.V. Ramamoorthy, Sallie V. Sheppard, Harold Stone, Akihiko Yamada

### Term Expiring 1993:

Fiorenza Albert-Howard, Jon T. Butler, Michael C. Mulder, Yale N. Patt, Anneliese von Mayrhauser, Benjamin W. Wah, Ronald Waxman

Next Board Meeting February 28, 1992, 8:30 a.m. Cathedral Hill Hotel, San Francisco, CA

### SENIOR STAFF

Executive Director: T. Michael Elliott

Publisher: H. True Seaborn

Director, Conferences and Tutorials: Anne Marie Kelly Director, Finance and Information Services: Tod S. Heisler Director, Board and Administrative Services: Violet S. Doan Assistant to the Executive Director: Sandra K. Pfau

### COMPUTER SOCIETY OFFICES

### **Headquarters Office**

1730 Massachusetts Ave. NW Washington, DC 20036-1903 Phone (202) 371-0101 Fax: (202)728-9614

#### **Publications Office**

10662 Los Vaqueros Cir. PO Box 3014 Los Alamitos, CA 90720-1264 Membership and General Information: (714) 821-8380 Publication Orders: (800) 272-6657 Fax: (714) 821-4010

### **European Office**

13, Ave. de L'Aquilon B-1200 Brussels, Belgium Phone: 32 (2) 770-21-98 Fax: 32 (2) 770-85-05

### **Asian Office**

Ooshima Building 2-19-1 Minami-Aoyama, Minato-ku Tokyo 107, Japan Phone: 81 (3) 3408-3118 Fax: 81 (3) 3408-3553